Attorney Docket No. 13DV-14080 (07783-0096)

D. AMENDMENTS TO THE DRAWINGS

There are no amendments to the drawings.

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E. REMARKS/ARGUMENTS

This Response is filed in response to an Office Action dated September 30, 2005

Upon entry of this response claims 1-17 and 28-30 will be pending in the application.

In the outstanding Office Action, the Examiner rejected claims 1-17 under 35 U.S.C. 103(a) as being unpatentable over Wheat et al. (U.S. Patent No. 6,863,925) (hereinafter "Wheat") or Kircher (U.S. Patent No. 6,730,179) (hereinafter "Kircher"), rejected claims 1-17 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-20 of Wheat, rejected claims 1-17 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Das et al. (U.S. Patent No. 6,560,870) (hereinafter "Das"), rejected claims 1-17 under 35 U.S.C. 112, second paragraph, and objected to the specification.

The Abstract was amended in a manner believed to obviate the Examiner's objections.

It is Applicant's intent to place the present application in condition for allowance. To this end, Applicant has fully addressed the Examiner's rejections as set forth in the Office Action dated September 30, 2005.

Rejection under 35 U.S.C. § 112

The Examiner rejected claims 1-17 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Specifically, the Examiner noted:

> In claim 1 line 15-16, the rate has units of mols per ft^3/hr which is deemed confusing. The units provided on 19-20 appear correct. Appropriate amendments are requested. The same issue applies to claims 15-17.

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Applicant respectfully traverses the rejection of claims 1-17 under 35 U.S.C. 112, second paragraph.

The Examiner has correctly cited lines 19-20 of claim 1 as reciting flow rate limitations of transport gas in the range of 20 ft^3/hr to 120 ft^3/hr for a period of time. However, lines 15-16 of claim 1 refer to a desired concentration of fluorine (0.036 to 0.18 mols) that is contained in each ft^3/hr of transport gas. As applied to lines 19-20 of claim 1, the amount of fluorine flowing in the transport gas over the recited flow rates ranges from about 0.18 mols (0.036 mols/ ft^3/hr * 20 ft^3/hr) to about 21.60 mols (0.18 mols/ ft^3/hr * 120 ft^3/hr). Since the amount of fluorine can be directly and unequivocally calculated, Applicant asserts that the terms "mols per ft^3/hr" appearing in claims 1 and 15-17 are not confusing, nor are they indefinite as recited.

Therefore, in view of the above, Applicant submits that claims 1 and 15-17 are not indefinite and comply with the provisions of 35 U.S.C. 112, second paragraph, and therefore are allowable.

Rejection under 35 U.S.C. §103(a)

The Examiner rejected claims 1-17 under 35 U.S.C. § 103(a) as being unpatentable over Wheat or Kircher. Specifically, the Examiner noted:

> Wheat discloses a vapor phase aluminiding method for coating an article with an aluminide coating that is modified with at least one other element such as a fluoride to enhance oxidation resistance and other environmental performance of the coating for use on gas turbine blades and vanes and other articles (col.1 line 64 – col.2 line 4). The amount of the modifying element introduced into the coating may be controlled through the deposition parameters to improving aluminide coatings (col.2 lines 1-10) and the modifying element can be aluminum try fluoride (col.2 lines 1-10) and the modifying element can be aluminum tri fluoride (col.2 lines 40-47). The substrate can be metallic such as nickel-base superalloy (col.3 lines 37-39) and argon can be used as a carrier gas (col.6 lines 17-18). The temperature can be 1850-2000°F (col.5 lines 40-42). However, the reference remains silent on flow rates and time.
>
> It is noted that Wheat specifically states that the deposition can be performed for a period of time (col.5 line 43) as well as sayint [sic] that the

ratio of materials are varied (col.5-6). It would have been obvious to one having ordinary skill in the art to have determined the optimum value of a cause effective variable such as flow rates and time through routine experimentation in the absence of a showing of criticality.

The limitations of claims 2-17 have been addressed above.

Applicants respectfully traverse the rejection of claims 1-17 under 35 U.S.C. § 103(a).

As understood, Wheat is directed to coating substrates using vapor phase aluminiding with a modified aluminum-containing coating.

As understood, Kircher is directed to applying the targeted application of aluminide coatings onto metal substrates.

In contrast, claim 1 recites a process for forming diffusion aluminide coatings on an uncoated surface of a substrate, without interdiffusing a sufficient amount of aluminum into a coating layer to adversely affect the coating growth potential or mechanical properties of said coating layer, comprising the steps of: providing a metal substrate comprising an external surface and an internal passage therein defined by an internal surface, at least a portion of the external surface of the substrate being coated with a coating layer selected from the group consisting of β-NiAl-base, MCrAlX, a line-of sight diffusion aluminide, a non-line-of-sight diffusion aluminide, a pack diffusion aluminide, and a slurry diffusion aluminide on said substrate, wherein the substrate is a gas turbine airfoil, and wherein the internal passage is a plurality of internal cooling passages which extend through an interior of the airfoil; cleaning the external surface of the substrate; subjecting the metal substrate to a aluminum vapor phase deposition process performed using a fluorine-containing activator selected from the group consisting of AlF_3, CrF_3, NH_4F, and combinations thereof, at a rate in the range of about 0.036 mols of fluorine per ft^3/hr of transport gas to about 0.18 mols of fluorine per ft^3/hr of transport gas, at a temperature in the range of about 1350°F to about 1925°F, using a transport gas selected from the group consisting of argon, nitrogen, hydrogen, and combinations thereof, the transport gas being provided at a flow rate in the range of about 20 ft^3/hr to about 120 ft^3/hr for a period of time in the range of about 2 hours to about 10 hours; and cooling the substrate.

In contrast, claim 1 recites a process for forming diffusion aluminide coatings on an uncoated surface of a substrate, without interdiffusing a sufficient amount of aluminum into a coating layer to adversely affect the coating growth potential or mechanical properties of said coating layer, comprising the steps of: providing a metal substrate comprising an external surface and an internal passage therein defined by an internal surface, at least a portion of the external surface of the substrate being coated with a coating layer selected from the group consisting of β-NiAl-base, MCrAlX, a line-of sight diffusion aluminide, a non-line-of-sight diffusion aluminide, a pack diffusion aluminide, and a slurry diffusion aluminide on said substrate, wherein the substrate is a gas turbine airfoil, and wherein the internal passage is a plurality of internal cooling passages which extend through an interior of the airfoil; cleaning the external surface of the substrate; subjecting the metal substrate to a aluminum vapor phase deposition process performed using a fluorine-containing activator selected from the group consisting of AlF_3, CrF_3, NH_4F, and combinations thereof, at a rate in the range of about 0.036 mols of fluorine per ft^3/hr of transport gas to about 0.18 mols of fluorine per ft^3/hr of transport gas, at a temperature in the range of about 1350°F to about 1925°F, using a transport gas selected from the group consisting of argon, nitrogen, hydrogen, and combinations thereof, the transport gas being provided at a flow rate in the range of about 20 ft^3/hr to about 120 ft^3/hr for a period of time in the range of about 2 hours to about 10 hours; and cooling the substrate.

Wheat teaches coating an article using a deposition technique which requires contacting the coating source to the article, i.e., tape. Tape processes are line-of-sight processes and cannot be used to satisfactory perform non-line-of site processes. Claim 1 recites a non-line-of site process for coating internal cooling passages extending through the interior of an airfoil, which interior coating cannot be achieved by the coating technique taught in Wheat.

Therefore, in view of the above, it is respectfully submitted that claims 1-17 are patentably distinct as to Wheat, thereby overcoming the obviousness-type double patenting rejection, and are therefore allowable.

The Examiner is reminded of MPEP 2144.05 (II) B which provides:

> B. Only Result-Effective Variables Can Be Optimized
>
> A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977) (The claimed wastewater treatment device had a tank volume to contractor area of 0.12 gal./sq. ft. The prior art did not recognize that treatment capacity is a function of the tank volume to contractor ratio, and therefore the parameter optimized was not recognized in the art to be a result- effective variable.). See also *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980) (prior art suggested proportional balancing to achieve desired results in the formation of an alloy).

The Examiner has not established flow rates and time as disclosed in Wheat or Kircher as being result-effective variables that can be optimized, and therefore cannot rely on the disclosure in Wheat and/or Kircher as a basis for this proposition. If this rejection is to be maintained, Applicant requests that the Examiner point out in Wheat and/or Kircher where flow rates and time are disclosed as having a recognized result allowing the conclusion that flow rates and times are result-effective variables that can be optimized.

Therefore, in view of the above, Applicant submits that claims 1-17 are not anticipated nor rendered obvious by Wheat and/or Kircher and are therefore allowable.

Double Patenting Rejection

A. Wheat

The Examiner rejected claims 1-17 under the judicially created doctrine of obviousness-type double patenting over claims 1-20 of Wheat. Specifically, the Examiner noted:

> Although the conflicting claims are not identical, they are not patentably distinct from each other because of diffusion aluminide is an obvious variation.

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B. Das

The Examiner rejected claims 1-17 under the judicially created doctrine of obviousness-type double patenting over claims 1-20 of Das. Specifically, the Examiner noted:

> Although the conflicting claims are not identical, they are not patentably distinct from each other because the elimination of turbine engine component is an obvious variation.

In contrast, claim 1 recites a process for forming diffusion aluminide coatings on an uncoated surface of a substrate, without interdiffusing a sufficient amount of aluminum into a coating layer to adversely affect the coating growth potential or mechanical properties of said coating layer, comprising the steps of: providing a metal substrate comprising an external surface and an internal passage therein defined by an internal surface, at least a portion of the external surface of the substrate being coated with a coating layer selected from the group consisting of β-NiAl-base, MCrAlX, a line-of sight diffusion aluminide, a non-line-of-sight diffusion aluminide, a pack diffusion aluminide, and a slurry diffusion aluminide on said substrate, wherein the substrate is a gas turbine airfoil, and wherein the internal passage is a plurality of internal cooling passages which extend through an interior of the airfoil; cleaning the external surface of the substrate; subjecting the metal substrate to a aluminum vapor phase deposition process performed using a fluorine-containing activator selected from the group consisting of AlF_3, CrF_3, NH_4F, and combinations thereof, at a rate in the range of about 0.036 mols of fluorine per ft^3/hr of transport gas to about 0.18 mols of fluorine per ft^3/hr of transport gas, at a temperature in the range of about 1350°F to about 1925°F, using a transport gas selected from the group consisting of argon, nitrogen, hydrogen, and combinations thereof, the transport gas being provided at a flow rate in the range of about 20 ft^3/hr to about 120 ft^3/hr for a period of time in the range of about 2 hours to about 10 hours; and cooling the substrate.

Das teaches coating an article using a deposition technique which requires contacting the coating source to the article, i.e., tape. Tape processes, as taught in Das, are line-of-sight processes and cannot be used to satisfactory perform non-line-of site processes. Claim 1 recites a non-line-of site process for coating internal cooling

passages extending through the interior of an airfoil, which interior coating cannot be achieved by the coating technique taught in Das.

Therefore, in view of the above, it is respectfully submitted that claims 1-17 are patentably distinct as to Das, thereby overcoming the obviousness-type double patenting rejection, and are therefore allowable.

Amendments to the Claims

Applicant has amended claim 1 to add the limitation that the metal substrate is a gas turbine airfoil having an internal passage including a plurality of internal cooling passages which extend through an interior of the airfoil. As support for this amendment may be found in the specification, Applicant submits that no new matter has been added as a result of the amendment to claim 1.

New Claims

Applicant has added new claims 28-30. Independent claim 28 is the combination of claims 1, 3 and 6. Independent claim 29 is the combination of claims 1, 3 and 7. Claim 30 is claim 8 depending from claim 29. As support for these claims may be found in the specification, Applicant submits that no new matter has been added as a result of these additional claims.

Therefore, for the reasons set forth above, Applicant submits that claims 28-30 are in condition for allowance as claims 28-30 are neither anticipated nor rendered obvious by Wheat and/or Das.

CONCLUSION

In view of the above, Applicant respectfully requests withdrawal of the outstanding rejections. As a result of the amendments and arguments provided above, claims 1-17 and 28-30 are thus in condition for allowance. As the claims are neither anticipated nor rendered obvious in view of the applied art, Applicant requests

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allowance of claims 1-17 and 28-30 in a timely manner. Applicant submits that no new matter has been added by the amendments to the claims or by the addition of new claims. If the Examiner believes that prosecution of this Application could be expedited by a telephone conference, the Examiner is encouraged to contact the Applicant. Applicant respectfully submits that claims 1-17 and 28-30 are not anticipated or rendered obvious by Wheat and/or Das.

The Commissioner if hereby authorized to charge indicated fees and credit any overpayments to Deposit Account No. 50-1059.

Respectfully submitted,

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